

March 30, 1937.

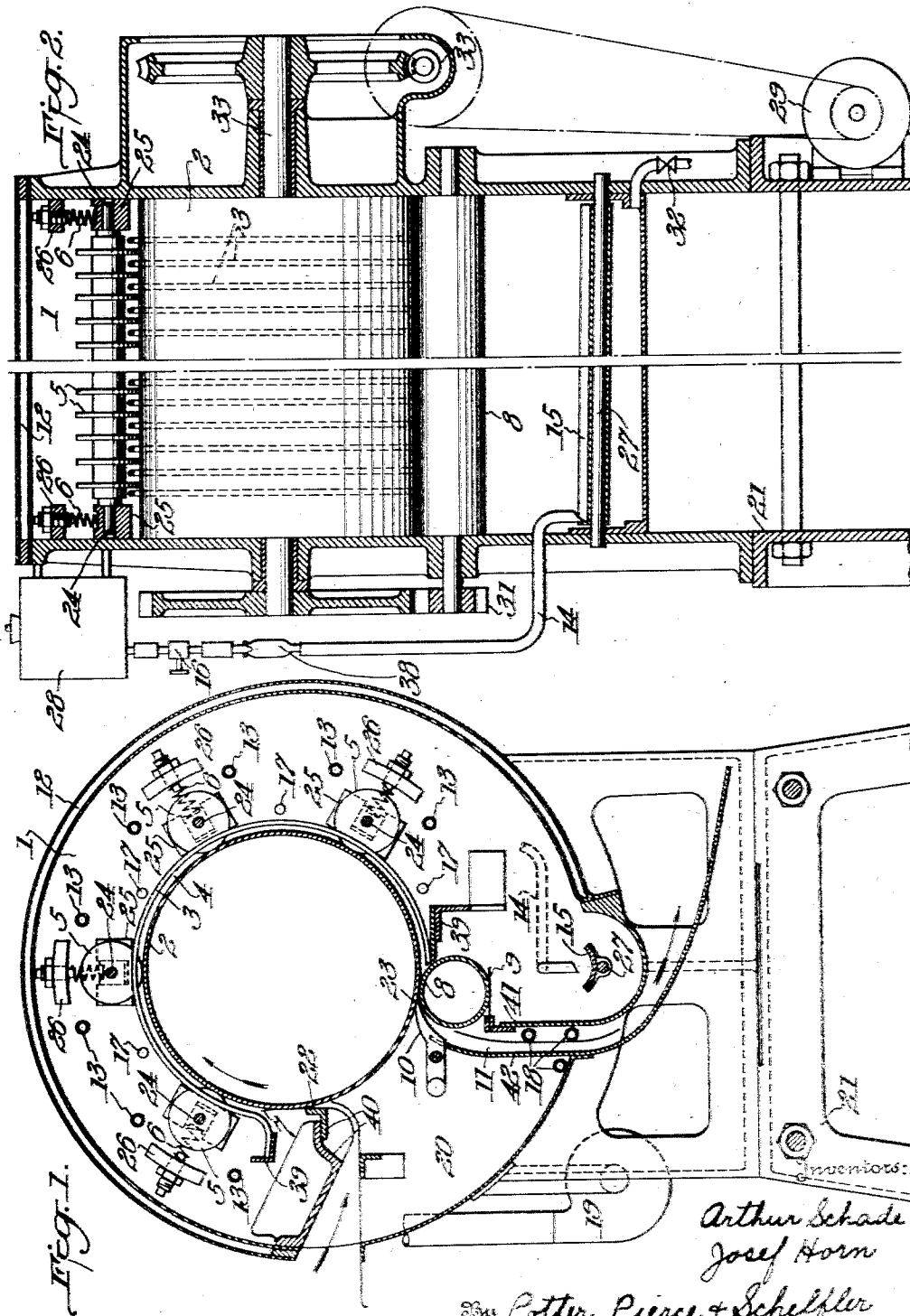
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2,075,306

DEVICE FOR DEVELOPING PHOTOGRAPHIC PRINTS

Filed Oct. 4, 1935

2 Sheets-Sheet 1



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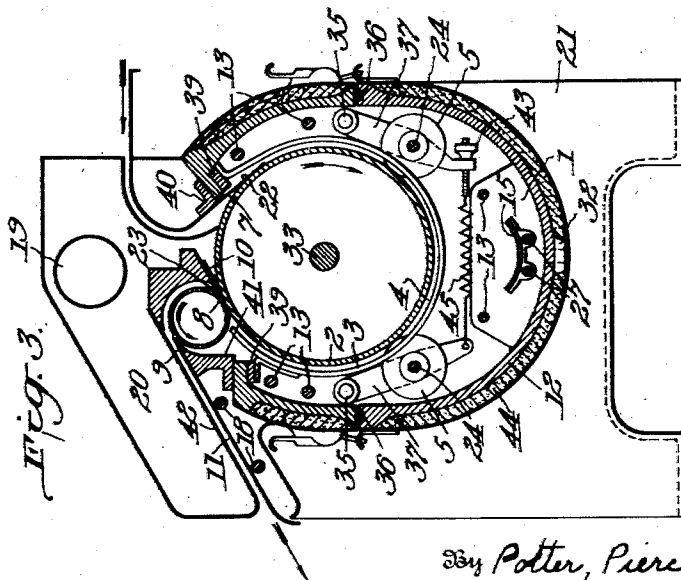
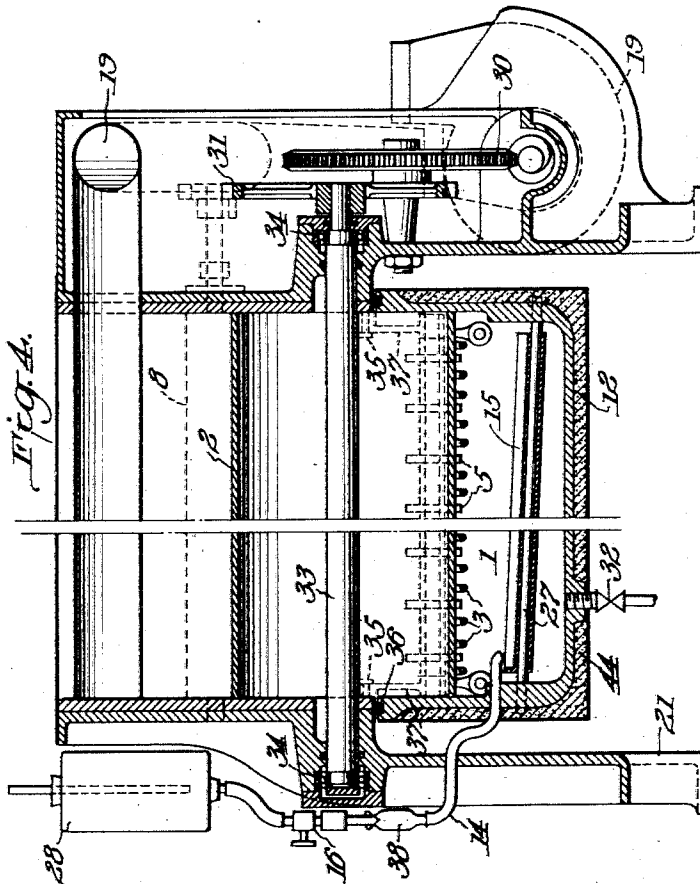
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,075,306

DEVICE FOR DEVELOPING PHOTOGRAPHIC PRINTS

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Application October 4, 1935, Serial No. 43,584
In Germany November 6, 1934

7 Claims. (Cl. 95-94)

The present invention relates to devices for developing photographic prints.

An object of the present invention is a device for the development of photographic prints by the aid of gaseous materials which, for the purpose of conveying the prints through the developing space, is provided with a relatively large driven roller and a number of smaller rollers, arranged around the large roller and lightly pressed up against this large roller so that they effect in conjunction with the latter the conveyance of the prints.

Other objects of the invention are springs, which press the said pressing rollers resiliently on the driven transport roller.

Further objects of the invention are stationary guiding members arranged around the large transport roller preferably at a distance which is greater than the thickness of the material to be developed, for example at a distance of several millimetres. These guiding members prevent any deviation of the prints fed between the single pressing rollers and ensure a reliable conveyance of the sheets around the transport roller.

Another object of the invention is a substantially gastight developing chamber, provided with an inlet slit and an outlet slit for introducing and discharging the material to be developed, within which chamber the described conveying system is arranged.

Further objects of the invention are devices for rendering the chamber air-tight. These devices are provided at the inlet slit and the outlet slit and operate in conjunction with the transporting system in the interior of the chamber so that on the one hand escape of the developing gas is prevented, and on the other hand reliable introduction and discharge of the prints is ensured.

Another object of the invention is a device for the production or admission of the developing gas. As such device there may be used a container arranged in the developing chamber filled with liquid ammonia and provided with heaters for evaporating ammonia gas. Other equivalent sources of ammonia gas will be described in the specification.

Further objects of the invention are heating devices, which prevent any condensation of moisture at the conveying elements and the sheets respectively, and effect at the same time an acceleration of the development.

Another object of the invention is a degassing device, for instance a ventilated chamber, preferably heated, provided at the discharge opening of the developing chamber and directly connected

to the said opening, whereby the prints, after development, are freed from any developing gas which may be on them.

Another object of the invention is a device for drawing off any developing gas which may escape through the inlet opening of the developing chamber.

Other objects of the invention will be seen in the specification following hereinafter.

The new developing machine permits a very efficient development of the sheets inasmuch as the prints are only touched by the conveying members on both sides at a few places, while the developing gases have free access to almost the whole of the print. Inasmuch as the prints in their passage from one pressing roller to another pressing roller are also not pressed tightly up against the conveying roller, the access of gas takes place from both sides at certain places, whereby the developing action is still further improved.

The invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a sectional end elevation of a constructional form of a developing device according to the invention, and Fig. 2 is a partial front sectional elevation thereof. Figs. 3 and 4 show another constructional form of a developing device according to the invention. Fig. 5 shows a constructional form of the heaters shown in Figs. 1-4.

Referring to the device shown in Figs. 1 and 2, the developing chamber 1 is mounted on the frame 21. In that chamber, which is filled with the developing gases, in particular ammonia, a relatively large conveying roller 2 turns which is driven by means of the motor 29 and the driving gear 30. The roller 2 may be provided with rubber strips on its surface for ensuring the transport of the prints to be developed. Around the said roller, at a distance of about 4 millimetres, a grid or cage made of strong circularly curved wires 3 is arranged to form a guide passage 4. The wires 3 are attached to the ledges 39, the latter being connected with the wall of the developing chamber. Around the large roller 2, which turns on the shaft 33, several radially resilient disc rollers 5 are arranged the axes 24 of which are slidably arranged in the slot-bearings 25. The disc rollers are pressed by their weight or by springs 6 mounted upon ledges 26 against the large roller. The disc rollers 5 are so arranged that the single discs pass individually between the wire members 3. The place of entry 22 for the prints is rendered air-tight by means of a

steel-band 7, which bears with moderate pressure on the roller 2 and prevents the escape of the developing gases. The steel-band 7 is attached to the ledges 40. At the point 23, where the prints emerge, a roller 8 is arranged, which is driven by the driving gear 31. The external surface of the roller 8 is rendered air-tight with regard to the chamber by means of the steel-band 9, the latter being connected with the casing by means of the ledges 41. The detaching members 10 lift the paper off the roller and direct it into the ventilation passage 11, which is limited on one side by the perforated plate 42. In the passage 11 the paper is freed from the developing gas and thereupon passes into the open air. The developing chamber 1 is bounded by the external surface of the roller 2 and the covering 12 of the device, which is insulated with regard to the exterior. Electrical heating elements 13, which heat the developing chamber to the most favorable temperature and prevent the condensation of water on the wires 3 and on the outer surface of the roller 2 are arranged around the roller 2 equidistant from center. The supply of ammonia to the device may be effected, for example, by causing a solution of ammonia to pass drop by drop from a container 28 by means of supply pipe 14 to a heated evaporating gutter 15 upon which it is vaporized within the developing chamber. The quantity of ammonia supplied is regulated by means of a needle valve 16 and may be observed by means of the show glass 38. 32 is a discharge tube for discharging waste liquid. It is also possible to supply the ammonia by allowing ammonia gas to pass from a steel container into individual tubes 17, which are arranged parallel to the conveying roller 2 and are provided on the side directed towards the material to be developed with a series of openings through which the gas emerges. In this way the web of paper which is to be developed is subjected to a uniform blast of developing gas, as a result of which a very strong developing action is attained. The removal of gas from the finished prints is effected on the one hand by the heating action of the heating elements 13 which heat the ventilation passage 11, and on the other hand by a current of air flowing in an opposite direction to the direction of motion of the prints, the said current of air being produced in the chamber 20 and the passage 11 by means of a ventilating fan 19.

In the Figs. 3 and 4 of the drawings another constructional form of a developing machine according to the invention similar to that shown in Figs. 1 and 2 is shown. The degassing device is arranged in this construction above the developing chamber 1. The latter has a double covering 12 which contains in its interior a heat insulating felt layer 44. The covering consists of an upper part and a lower part, which latter is removably arranged to facilitate repairing in the interior of the chamber. A tight connection between the upper and lower parts is effected by means of a rubber ring 36. In the interior of the developing chamber is arranged a transport roller 2, the shaft 33 of which is mounted in roller bearings 34. The disc rollers 5 are mounted upon the levers 37 which latter are pivotally arranged on the shafts 35. The free ends of the said levers are connected to one another by means of the springs 45, so that the disc rollers 5 are resiliently pressed on the transport roller 2. A screw 43 is provided permitting to regulate the tension of the spring 45.

The other parts of the machine correspond to that of the construction shown in Figs. 1 and 2.

We claim:

1. A device for gaseous development of light sensitive material comprising a developing chamber provided with an opening, a driven transport roller arranged in the said opening and extending into the interior of the said chamber, resilient pressing means in combination with the edges of the said opening and touching the said transport roller so forming a gastight inlet slit and a gastight outlet slit respectively for the material to be developed, a series of pressing rollers around the said driven transport roller and resiliently bearing upon that roller, stationary mechanical guiding elements arranged at a certain distance around the said driven transport roller and extending in the interior of the chamber from the inlet slit to the outlet slit, a source of developing gas in the said chamber, heating elements for heating the interior of the developing chamber, and a degassing chamber adjacent the outlet opening of the developing chamber.

2. A device for gaseous development of light sensitive material comprising a gastight developing chamber, a source of developing gas, an inlet opening and an outlet opening in the said developing chamber, a driven transport roller provided in the said chamber, resilient pressing members in conjunction with the said openings and touching the said driven roller so causing the material to be developed to be fed into the developing chamber and discharged out of the said chamber without any escaping of gas, a grating consisting of curved wires arranged around the said transport roller at a certain distance from the roller which extends in the interior of the chamber from the inlet opening to the outlet opening so forming a guiding passage, a series of disc rollers around the said driven transport roller passing through the said wire grating and pressed resiliently against this roller, heating elements in the said developing chamber, and a degassing chamber adjacent the outlet opening of the developing chamber.

3. A device for gaseous development of light sensitive material comprising a developing chamber, a source of developing gas and a driven transport roller provided in the said chamber, resilient pressing members in conjunction with the walls of the chamber and touching the said driven roller so forming a gastight inlet slit and a gastight outlet slit for the material to be developed, a grating consisting of curved wires arranged around the said transport roller at a certain distance from the roller and extending in the interior of the chamber from the inlet slit to the outlet slit, a series of disc rollers around the said driven transport roller passing through the said wire grating and pressed by means of spring-action against this roller, heating elements in the said developing chamber near the rollers and the guiding elements and a degassing chamber adjacent the outlet opening of the developing chamber.

4. A device of the class described comprising a developing chamber, a source of developing gas and a driven transport roller provided in the said chamber, a resilient metal band attached to the wall of the developing chamber and touching the said driven roller so forming a gastight inlet slit, a cage consisting of curved wires arranged around the said transport roller at a certain distance from the roller forming in the interior of the chamber a guiding passage, which passage is

immediately joined to the inlet slit, a series of disc rollers around the said driven transport roller passing with their discs through the said wire cage and pressed by means of spring action against the said transport roller, a driven pressing roller arranged at the end of the said passage and touching resiliently the said transport roller so forming a gastight outlet opening, a metal band attached to the wall of the developing chamber and touching the said driven pressing roller so forming a gastight closure, heating elements near the rollers and the guiding elements and a degassing chamber adjacent to the said outlet opening, the said degassing chamber being in connection with a suction device.

5. A device of the class described comprising a developing chamber, a source of developing gas and a driven transport roller provided in the said chamber, a resilient steel band attached to the wall of the developing chamber and touching the said driven roller so forming a gastight inlet slit, a cage consisting of curved wires arranged around the said transport roller at a distance which is larger than the thickness of the prints to be developed so forming a guiding passage in the interior of the chamber, which passage is immediately joined to the inlet slit, a series of disc rollers around the said driven transport roller mounted with their axles in slot bearings, passing with their discs through the said wire cage and pressed by means of spring action against this transport roller, a driven pressing roller arranged at the end of the said guiding passage and touching resiliently the said transport roller so forming a gastight outlet opening, a steel band attached to the wall of the developing chamber and touching the said driven pressing roller so forming a gastight closure, heating elements near the rollers and the guiding elements and a heated

slit-like degassing chamber immediately adjacent to the outlet opening, the said degassing chamber being in connection with a suction device.

6. A device for gaseous development of light-sensitive material comprising a developing chamber, a source of developing gas and a driven transport roller provided in the said chamber, resilient pressing members in conjunction with the walls of the chamber and touching the said driven roller so forming a gas-tight inlet slit and a gas-tight outlet slit, for the material to be developed, a grating consisting of curved wires arranged around the said transport roller at a certain distance from the roller and extending, in the interior of the chamber, from the inlet slit to the outlet slit, a series of disc rollers around the said driven transport roller passing through the said wire grating and pressed elastically against this roller and heating elements in the said developing chamber near the rollers and the guiding elements.

7. A device for gaseous development of light-sensitive material comprising a developing chamber, a source of developing gas and a driven transport roller provided in the said chamber, resilient pressing members in conjunction with the walls of the chamber and touching the said driven roller so forming a gas-tight inlet slit and a gas-tight outlet slit, for the material to be developed, a grating consisting of curved wires arranged around the said transport roller at a certain distance from the roller and extending, in the interior of the chamber, from the inlet slit to the outlet slit and a series of disc rollers around the said driven transport roller passing through the said wire grating and pressed elastically against this roller.

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